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Repository Operations and Procedures
for the
Software Technology for Adaptable, Reliable Systems (STARS) Program

Contract No. F19628-88-D-0032

Task IR11 — STARS Repository Policies and Procedures

CDRL Sequence No. 1470

7 March 1990

Prepared for:

Electronic Systems Division
Air Force Systems Command, USAF
Hanscom AFB, MA 01731-5000

Prepared by:

IBM Systems Integration Division
800 North Frederick Avenue
Gaithersburg, MD 20879

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300 North Frederick Avenue
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T. Ward

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IBM Federal Sector Division
800 N. Frederick Avenue
Giathersburg, MD 20879

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An assessment of reuse library data focusing on about ownership, data rights, ITAR restrictions, as well as quality and consistency. The document also proposes terms and conditions for Government license agreements and provides sample forms to collect data for operating a reuse library. The focus is on the policies and procedures for the STARS Repository.

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Repository Operations and Procedures

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Hanscom AFB, MA 01731-5000

Prepared by:

IBM Systems Integration Division
18100 Frederick Pike
Gaithersburg, MD 20879

ABSTRACT

This document contains a set of repository policies and procedures that are based on the operational experience with the current STARS Repository Prototype. They must be expanded with additional operational experience and approved prior to the general availability of the STARS Repository to the public sector or specific subsets of the public sector, e.g., any current Government contractor. The recommended repository policies and operating procedures have to evolve as experience is gained from actual operation of the repository. This is particularly true when guidelines, standards, scope of content, and the use of the repository is open to additional user classes, e.g., other DoD projects, Government agencies, and private industry. Several issues that must be constantly reviewed, e.g., cost of operation, repository staff responsibilities, limited data rights, and risks involved with the repository operation and component reuse.

(KR)

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1.0 SCOPE

1.1 IDENTIFICATION

This document, Repository Operations and Procedures (CDRL 1470) addresses STARS RFP SOW Section 4.0 of Delivery Order IR11 (Subtasks 11.3, 11.4, 11.5, and 11.7).

1.2 PURPOSE

A brief assessment of the existing prototype capabilities is included in this document. The assessment also covers the contents with respect to the quality and consistency of the components, i.e., documentation of component ownership, data rights, and ITAR Restriction considerations. This document also provides candidate terms and conditions for Government license agreements and sample forms to collect data required to operate the repository. The samples are for review/selection by the component suppliers and repository managers. This includes license agreements for Government developed or owned software where the Government would like to limit the use of the reusable software or related information. The output of Task IR11 is expected to be used to help evolve the STARS Repository to the status of a National Repository. This document also contains a set of recommended procedures to help in the operation and maintenance of the STARS Repository System.

1.3 INTRODUCTION

The installation and user procedures of individual hardware and software products used to build the current STARS Repository System are assumed to be included as a part of the individual products. This document defines high-level operation guidelines and procedures for the STARS Repository, i.e., this document is written to give all current or potential users a quick overview of the repository guidelines and procedures. Referenced and product related documents should be examined for additional detail.

The overview contains a listing of key references that can be reviewed for a better understanding of the concepts of the STARS Repository, the definition of the terms used, and a brief assessment of the current repository prototype. The conclusions reached in preparation of the assessment are the basis for the remaining sections, i.e., a consistent method of collecting information, evaluating candidate components, and managing the repository. Consistent, comprehensive, and automated procedures/processes are required to ensure high quality contents and reasonable operating expenditures.

2.0 REFERENCED DOCUMENTS

The following documents were used in the generation of this document.

2.1 GOVERNMENT DOCUMENTS

F19628-88-R-0011	The STARS Competing Primes Lead Contract, Request for Proposal, dated 6 November, 1987.
DI-S-3591	Technical Reports
(none)	User's Guide to DACS Products & Services (April 1987, RADC/COED, Griffiss AFB, NY 13441-5700)
(none)	DACS Newsletter (Volume VII, Number 2, June 1988)
(none)	DACS Bulletin (Volume IX, Number 1, January 1989)
(none)	DACS Products & Services Information (March 1987
(none)	DACS Products & Services Form (March 1987)
IBM CDRL 0360	Reusability Guidelines for the STARS Program, dated December 17, 1988
IBM CDRL 0370	Reusable Component Data Analysis for the STARS Program, dated February 10, 1989
IBM CDRL 0380	Consolidated Reusability Guidelines for the STARS Program, dated March 21, 1989
IBM CDRL 0390	Taxonomy Observations for Reusable Ada Components for the STARS Program, dated March 21, 1989
IBM CDRL 0460	Repository Guidelines for the Software Technology for Adaptable, Reliable Systems (STARS) Program, dated February 25, 1988
IBM CDRL 0470	Long-range Repository/Distribution Plan for the STARS Program, dated February 25, 1989
IBM CDRL 0480	Enhanced Repository Formal Demo, dated February 24, 1989
IBM CDRL 0490	Enhanced Repository Demo Report, dated March 3, 1989
IBM CDRL 0500	Specifications for the Prototype Enhanced Repository, dated January 19, 1989
IBM CDRL 0510	Enhanced Repository Implementation Improvement Report, dated March 16, 1989

IBM CDRL 0520	Long Term Configuration Management Plan for the STARS Repository, dated March 17, 1989
IBM CDRL 0530	Implementation of the Prototype Enhanced Repository, dated March 16, 1989
IBM CDRL 0700	Recommended Ada Format Guidelines for the STARS Program, dated October 18, 1988
IBM CDRL 1440	Practical Aspects of Repository Operations for the STARS Program, dated January 10, 1990
IBM CDRL 1450	Repository Policy Development Plan, dated November 17, 1989
IBM CDRL 1460	Draft Policies and Procedures for the STARS Repository, dated January 19, 1990
IBM CDRL 1540	Repository Guidebook (Draft), dated September 14, 1989
IBM CDRL 1550	Repository Guidebook (Draft), dated January 31, 1990
IBM CDRL 1570	Filter Prototype, dated January 24, 1990 (and earlier releases A, B, and C)
IBM CDRL 1580	Taxonomy/Classification, dated January 19, 1990
IBM CDRL 1590	Repository Prototype System Specification, dated February 16, 1990
IBM CDRL 1600	Repository Prototype, Release A, dated July 15, 1989 (and subsequent releases B, C, and D)

2.2 NON-GOVERNMENT DOCUMENTS

ORACLE_SQLREF	SQL Language Reference Manual, Version 5.1, September 1988, Copyright(C) 1988, Oracle Corporation, Belmont, California
ORACLE_DBA	Oracle Database Administrator's Guide, Part 3601, Version 5.1, Copyright(C) 1988, Oracle Corporation, Belmont, California
ORACLE_UTIL	Oracle Utilities User's Guide, Part 3602, Version 5.1, Copyright(C) 1987, Oracle Corporation, Belmont, California
ORACLE_SQLLOAD	SQL Loader User's Guide, Part 3606, Version 1.0, June 1987, Copyright(C) 1987, Oracle Corporation, Belmont, California

ORACLE_SQLFORM	SQL Forms Operator's Guide, Part 3301, Version 2.3, December 1987, Copyright(C) 1987, Oracle Corporation, Belmont, California
ORACLE_QUICK	SQL Forms Operators Quick Reference, Version 2.3
ORACLE_ERRCODE	Oracle Error Messages and Codes Manual, Part 3605, Version 1.0, Copyright(C) 1987, Oracle Corporation, Belmont, California
ORACLE_VMS	Oracle for DEC VAX/VMS Installation and User's Guide, Part 1001, Version 5.1, Copyright(C) 1988, Oracle Corporation, Belmont, California

3.0 OVERVIEW

The prototyping efforts for the STARS Program have produced a number of deliverables and many are included in the "Government Documents" on page 2 and will be referenced in the appropriate paragraph in this document. For an overall understanding of the Repository Operation and Procedures the following references (CDRLs) need to be reviewed and understood by the Repository Staff, i.e., the individuals responsible for the operation, maintenance, and improvement of the repository system.

- Repository Guidelines (CDRL 0460)
- Long Term Repository/Distribution Plan (CDRL 0470)
- Long Term Configuration Management Plan (CDRL 0520)
- Practical Aspects of Repository Operation (CDRL 1440)
- Repository Policy Development Plan (CDRL 1450)
- Draft Policies and Procedures (CDRL 1460)
- Repository Guidebook (CDRL 1540)
- Repository Filter Prototype (CDRL 1570)
- Repository Prototype (CDRL 1600)

The Repository Staff must also be familiar with the specific roles each is expected to fill in the operation of the Repository System. This includes specific knowledge and skills related to specific operational requirements, e.g., tuning, backup, and recovery of the database. Each product or component used to build or maintain the repository shall have user documentation that is procured or produced and maintained for the Repository Staff, e.g., Database Administrator's Guide (ORACLE_DBA). Several of the key documents are listed in "Non-Government Documents" on page 3 that are also required for the Repository Staff and Reusers.

The terminology used in this document is summarized in the following paragraph and is consistent with the terms used in the referenced items (CDRLs) listed above.

3.1 TERMINOLOGY

The following is a list of terms and definitions used in this report. The terms are presented in a descriptive order which supports the relationship between the terms.

component — A collection of related work products to be used as a consistent set of information. Software work products can include specifications, design, source code, machine code, reports, compilation units, code fragments and other components. It is the primary object type for search and access of the repository. A component is defined as related work products and one or more referenced components, e.g., a set of integrated components. Also referred to as an **asset**, or **resource**.

part — An individually selectable element of a component, such as design documents, source code, test informa-

tion, and data rights. While a part may be copied or browsed, when stored in a repository it is always associated with a component.

reuse The application of existing solutions, as captured in components, to a problem other than the one for which the component was originally built.

repository An element of the software engineering environment in which software work products and information about them are stored. It is the primary support element for reuse. A repository can be built with one or more libraries of components. The repository system shall have the capability to import (or export) specific libraries from (or to) another repository.

repository library A collection of reusable components that require special handling, e.g., access control, higher level security, privacy requirements, or limited access during specific software development phases. Libraries can be replicated in one or more distributed repositories but a master repository must be designated for each library to ensure the consistent updating of the components in each copy or replication of the library.

repository system An instance of the software engineering environment, including computer hardware, operating systems, software tools, standards, and procedures that together provide a complete repository capability. These capabilities include acquiring, storing, managing, retrieving, and dispensing software work products and information about them.

depository A repository or part of a repository whose contents are deposited as is, with few or no constraints. A depository is mainly a storage facility. Quality and usability are unpredictable; the burden is on the user to find and evaluate useful items.

organized repository A repository whose contents are documented and organized in a comprehensive manner as components and parts. Finding, reviewing, and extracting components are supported. The quality and usability remain unpredictable.

filtered repository A repository whose components are subjected to standards on form, content, quality and consistency. This may not be a physical partition from an organized repository; rather it could be a documented higher level of confidence in an existing organized component.

certified repository A repository whose components exhibit the highest level of confidence. A certified component supports the proving of correctness of the solution that reuses the component. Aspects of security, ownership, distribution, and user set take on greater importance in a certified repository.

reuser A person who reviews the contents of a repository and extracts components for reuse. The common user of a repository. Also referred to as a **user**.

supplier A person who places components into a repository. Also referred to as a **contributor**, **submitter**, or **owner**.

operations staff Persons who coordinate, organize, and control the contents of a repository and have the day-to-day operations of the Repository System and the Repository. For particular responsibilities staff personnel are referred to as a **manager**, **system administrator**, **librarian**, **database administrator**, **repository administrator**, or **repositarian**. The System Administrator provides a first level help to other users for Repository System problems. The Librarian provides the first level help for problems with the contents or the capabilities of the Repository.

topic specialist A person who understands the repository domain and many of the components in the repository. This person gains their understanding by being responsible for the evaluation of components and promoting them to filtered or certified status. Also referred to as a **domain expert**, or **technical consultant**. This person frequently provides a second level help for other users, via reference from the librarian. This person need not be a member of the operations staff.

filtering The act of evaluating components and promoting them to filtered status. The process can be manual and/or automated but the librarian makes the actual decision to add new components and remove obsolete components.

gatekeeper An automated capability that facilitates filtering. This capability is initiated by the librarian or by someone designated by the librarian.

evolution plan A document or section of a document that summarizes the repository system capabilities in a chronological order. This plan will be on-line to provide scope and direction information to potential suppliers and reusers. This plan should correspond to actual plans and commitments contained in documents not accessible to the repository users, e.g., repository operations contract/reports.

repository manager The person who is responsible for the operation of the repository system, i.e., to ensure that adequate hardware, software, and operations staff are available to support the STARS Repository System. The manager also approves the evolution plan developed by the operations staff.

3.2 REPOSITORY SYSTEM

The repository requirements are defined in the Repository Prototype System Specifications (CDRL 1590), in the Repository Guidebook (CDRL 1540), in the terms and conditions of the repository operations contract, and in documents referenced by these documents. Together they establish the capacity and performance criteria of the repository. The following paragraphs summarize the basic requirements and responsibilities for the repository system (see CDRL 1440 for the details of the current IBM Team STARS Repository).

The scope of the responsibility is determined by the contract established for the operation of the repository system. The repository manager shall ensure that adequate licenses or contracts are established for the use of commercial products required by the repository system. This shall also includes maintenance contracts for all products that the operations staff is not capable of performing or are not authorized to perform under the corresponding product license or contract. Where maintenance is to be performed by the operations staff, adequate tools shall be included in repository system to analyze and correct errors or failures in products. The products include both hardware and software items as summarized in the following paragraphs and shall be chosen to support all standards specified by the STARS Program, e.g., test components adhering to the Standard Query Language (SQL), the Standard Graphical Markup Language (SGML), and the Virtual Operating System Interface (VOSI).

A repository system evolution plan shall identify the capabilities and the selected hardware and software products by name, version, and release number. This plan shall be maintained by the repository manager and be in conformance with the long term plans of the STARS Program, i.e., with respect to capacity and performance requirements, to industry standards, and to time/budget constraints. The plan shall cover the electronic and hard-copy storage and distribution resources in detail, e.g., permanent and consumable media quantities. This plan shall also assume that data or other forms of reusable information will be collected and provided to the repository users, e.g., tested or recommended initialization data for products such as terminals, terminal emulators, and network bridges.

3.2.1 HARDWARE

The central computer system selected shall have the capability to support the STARS Repository System performance requirements. The computer system shall have sufficient backup capability to meet the response-time and the availability requirements. A central computer system includes processors, storage devices, peripherals, and communication devices. The term central computer system is used for a single-site repository or to distinguish a master repository site from one or more distributed repositories in the STARS Repository System, e.g., the distributed repositories can contain shadows of libraries copied from a master library (CDRL 0470). Additional description of the repository system hardware is in "Repository System Hardware" on page 34.

3.2.2 SOFTWARE

The repository system is assumed to support an Ada Software Engineering Environment (SEE), and therefore the products and tools listed below will have to be augmented or tailored to address non-Ada Requirements. The repository system evolution plan shall cover all Ada and non-Ada product requirements including the tailoring of component types and templates, e.g., the format and syntax of required prologues. The operations staff shall be familiar with the software used in the computer system used by the repository system but also have and/or be familiar with the hardware and software used to support the typical repository user, e.g., terminal emulators and file transfer programs. The rationale for the staff having and/or understanding the various products is to prevent minor changes to the STARS Repository System causing adverse impact to repository users. Additional description of the repository system hardware is in "Repository System Software" on page 35.

3.3 REPOSITORY ASSESSMENT

The assessments contained in the following paragraphs are based on a manual examination of a large number of the current components and the use of the Repository System to develop STARS contract deliverables. The current operating procedures were also reviewed with respect to the manual steps required and the results achieved. The primary conclusions are that the current repository capabilities are powerful with respect to search and access but that additional tools or automation is required to efficiently install components in the repository.

A more automated process to load components and information that describe components will reduce labor costs and increase the quality of the data. The first step in this direction was in the gatekeeper (CDRL 1570) and provides a general capability to "filter" components that are supplied to the repository. The prototype allows insertion of new automated tools into the filtering and acceptance process. Suppliers can also execute the process or portions of the process to assure themselves of the correctness of submissions before the Repository Staff become involved resulting in fewer rejects (and reduced labor costs for repository operation).

3.3.1 REPOSITORY SYSTEM CAPABILITIES

The capabilities provided by the Repository System were used to develop the latest capabilities added to the repository prototype. This included Ada programming support (i.e., APSE) and database application development support (i.e., Oracle RDBMS support tools). Other general capabilities were used including MAIL and FORUM communication as well as repository contents and capabilities, e.g., a new version of the Window Manager, Problem Reports, and help/information stored on the Repository System.

The capabilities of the system were adequate to evolve the repository prototype and to support the repository in a software development envi-

ronment. Component search and access was acceptable at 2400 baud but limited productivity in a real development effort, e.g., CDRL 1600. The transfer rate was also too slow to distribute large components or a large number of components. The 9600 rate was acceptable for the development efforts and most data transfers (9600 was very unreliable because of frequent errors and dial-up line disconnects). The STARS Repository should support bulk data transfers via magnetic tape or diskettes to achieve significant usage by development projects.

3.3.2 REPOSITORY CAPABILITIES

The capabilities of the repository would have been more responsive to the reuser if the repository and repository capabilities were installed locally and shadows of the libraries moved periodically by bulk transfer (CDRL 0470). The repository capabilities allow documents and component analysis reports to be located and reused. This does save significant development time over manual directory search and retrieval. All documents and Ada code deliverables should be moved to the repository library to allow for faster searching, i.e., efficient reuse of the information.

3.3.3 CONTENTS

The contents of the repository need be increased to include many more ready-to-use components, e.g., large components that have already been tested and integrated with other reusable components. Productivity does not significantly increase by the use of a few small reusable components, e.g., stacks, queues, and lists. The large and high quality components (e.g., dictionaries, window managers, navigation, guidance, and control packages) provide significantly better gains in productivity.

All types and sizes (i.e., domain and scope) of reusable information and software code (i.e., Ada and non-Ada programming/source) are supported. The emphasis should be placed on collecting large, high quality software. High quality includes components that are easy to use, well documented, tested, and enhanced, i.e., contain test data, analysis reports, and integrated. Integrated components include those that are built to the same set of standards, virtual interfaces or abstract layers, and have been tested with other components that are contained in the repository. Completeness, correctness, and consistency of the information in the repository are required attributes for any repository to achieve wide-spread acceptance. The following policies and procedures are the first items recommended for achieving the desired repository attributes.

3.3.4 DATA RIGHTS

The current contents include many components where the data rights are not clearly described. The current contents should be updated and all new component submissions checked for conformance with the guidelines and

standards described in the Repository Guidebook (CDRL 1540) and in the Draft Policies and Procedures (CDRL 1460).

4.0 POLICIES AND PROCEDURES

The following paragraphs contain the initial set of recommended policies and procedures organized by the role of the corresponding user. The first set presented are applicable to any user, the remaining paragraphs are grouped by:

- Component Supplier/Owner
- Repository System Manager
- Repository System Administrator
- Repository Administrator/Librarian
- Component Reuser/Subscriber

4.1 GENERAL POLICIES AND PROCEDURES

The recommended policies and procedures for the STARS Repository System are listed in the following paragraphs. These policies and procedures shall be updated as the mission or scope of the repository changes.

4.1.1 POLICIES

The repository manager is expected to maintain a set of repository policies and have procedures in place to ensure that each policy is appropriate during the operational lifetime of the STARS repository.

1. The initial availability of the STARS Repository will be for access by any individual or organization participating in U.S. Government sponsored programs. After the repository capabilities have stabilized and contents have expanded (i.e., the STARS Program has determined that the contents have proven themselves to the point that users can expect to achieve a significant cost savings) the scope of users can be extended (e.g., to academic and commercial organizations).

2. Users of the repository shall be currently registered individuals associated with a particular registered organization. This requirement can be satisfied by simple registration forms to be completed and signed and filed with the Repository staff. Each organization shall be responsible for the accuracy of the registration information of both the organization and the individuals registered in association with that organization.

3. Organizations shall register and identify an individual to assist the Repository Manager with the administration of the repository, e.g., the identification of valid, registered members of the organization, the assignment or the recovery from lost passwords. The identified individual will receive periodic repository status information and repository activity or other summary reports associated with the organization.

4. The definition of (STARS Repository System) registered organizations is not limited to a company, division of a company, a specific site, or any Government agency partitioning but each organization shall designate a specific individual (i.e., to coordinate repository related activities) and the organization must have a valid mailing address. A network mailing address for on-line transfer is desirable but shall not be required.

5. Information relating to individuals or organizations that is not required for legal or a specific operational requirement identified in the STARS Operational Procedures shall not be stored in the Repository System. Information that is stored shall only be distributed as defined the operational procedures or by a specific court order.

6. All information stored about an individual or organization shall be readily available to the corresponding individual or organization. Such information will be purged when it is no longer required. Deletion of the information can occur at the termination of a valid registration status as defined in the operational procedures.

7. No DoD Classified information and ITAR (International Traffic in Arms Regulations) items will be stored in the repository until such time as adequate content protection mechanisms are in place as well as methods to identify authorized individuals. The protection mechanism includes the distribution process to the requesting individual or organization.

8. Proprietary or other company labelled confidential information shall not be stored in the STARS Repository.

9. Copyrighted information (or other forms of protection) by individuals or organizations can be stored in the repository if the appropriate authority has been acquired to store, duplicate, distribute, and use the information.

10. Information with other forms of protection (e.g., Patent) can be stored as long as the terms and conditions allow the Government and Government contractors to use and maintain (e.g., Government purpose license) the component. The complete definition of all maintenance restrictions shall be included, e.g., only corrections to existing capabilities.

11. Operational staff shall not discuss or report specific information relating to the rejection of submitted components or parts to anyone other than the corresponding supplier or their representative.

12. Operational staff shall not retain data from submitted components or component parts if the submission is rejected and not corrected by the supplier beyond 30 days unless previously agreed to by the supplier and repository manager.

13. The collection or growth of the repository contents will be driven by the availability of reliable, reusable components. The effort expended in growth will be based on a priority established by the STARS Program, e.g., the frequency of occurrence of particular functions in current or future DoD Contracts and the degree to which candidates match standards established for the STARS Program. This

prioritization will take into consideration current trends in standardization that are occurring in the industry.

14. Priority shall be given to Government owned information and public domain information over more restricted types, e.g., joint ownership. Guidelines and procedures shall be included in the STARS Operational procedures to assist in the validation of data rights associated with the information contained in the repository.

15. Duplicate or overlapping component capabilities will be allowed but efforts should be expended to ensure implementations are available for a set of platforms as determined by the STARS Program. The platform does include both development environments (host systems) and the application environments (target systems). The definition of environment includes hardware (e.g., a particular commercial system) and software (e.g., one or more components such as operation system and database system).

16. Information contained in Problem, Response, and Change Reports shall not contain confidential or proprietary data as defined above. The information shall be available to any individual having access to the corresponding Component or Repository System capability, e.g., the information shall be available for use by the individual having retrieved or subscribed to the Component with the understanding that the report is the opinion of the author and has not been reviewed for correctness or applicability to the particular user's particular application.

17. Any and all fees charged to registered individuals or organizations must be clearly defined in the STARS Operational Procedures and approved by the STARS Program or the responsible organization within the DoD.

18. Repository staff shall ensure the acceptance criteria and procedures do not impose an unjustified burden on a particular supplier or class of suppliers. This includes making sure the filtering process is simple, documented, and fair to all suppliers.

4.1.2 STANDARDS OF CONDUCT

Every user of the STARS Repository System is expected to:

1. Adhere to the policies and procedures that are defined to ensure the Repository System can be of maximum benefit to the user community.

2. Adhere to the STARS Repository System warning and advisory messages appearing at the time of sign-on or during the user's terminal session.

3. Adhere to the data rights and other restrictive clauses contained in the accessed or retrieved information, i.e., the reusable Components and Component Parts.

4. Report all known problems with security, integrity, or service to the Repository System Manager and to his/her organization's designated coordinator and other appropriate authority.

5. Treat and support users or user classes the same, without regard to the individual, their organization, or the project with which they are associated with unless approved by the STARS Program or responsible DoD organization. This statement does not apply in the case of restricted data rights or for any other legal restrictions or considerations.

6. Submit no information to the repository that is know to be incorrect, e.g., components, parts, and reports. Likewise, no user shall generate Problems Reports that are known to be incorrect or mislead any other user.

7. Define passwords at least 6 (six) characters in length and not trivial, e.g., a common name, initials, date, or any obvious value or pattern that could be easily associated with a repository function or an individual.

8. Redefine your password at least every sixty days or when notified by the Repository System Administrator.

9. Report lost or compromised passwords to the Repository System Manager and to your organization's designated coordinator or other appropriate authority (if you suspect compromised or destroyed data).

4.1.3 COMMUNICATION PRIVACY

Recorded information that relates to specific individuals, e.g., computer time used and component subscriptions, shall only be communicated with the corresponding user, the organization's designated user (or alternate) for repository coordination, the System Manager, and anyone designated in the contractual documents related to the repository operation. The System Administrator shall use the designated user (or alternate) to assist in the recovery from a forgotten password to confirm the identity of the user.

4.1.4 PROCEDURES

The following procedures are applicable to any user of the repository, i.e., suppliers, operations staff, and reusers. Specific procedures for each major type of user is included in subsequent paragraphs.

4.1.4.1 Registration

All STARS Repository Users shall provide the information required to operate the repository in an efficient and safe manner, i.e., to ensure that data integrity, security, and access policies of the STARS Repository System can be enforced. This information includes data on the user (Figure 4 on page 44) and the user's organization (Figure 6 on page 45).

4.1.4.2 Security

All users are responsible for security on a day-to-day basis, e.g., not sharing or otherwise exposing passwords. The Repository System manager is responsible for ensuring proper definition of and adherence to security procedures, e.g., initiating unannounced audits. The Repository System Administrator can be assigned the task of the actual audit or it can be assigned to an outside organization. Detailed procedures are discussed in paragraphs that correspond to the various Repository Staff roles.

4.1.4.3 Termination

The organization or the organization's designated coordinator shall be responsible for notifying the Repository System manager or the System Administrator when user registrations are to be terminated, e.g., the particular user is no longer a member of the organization. Termination of the user's registration or specific library access rights can be initiated by the System Manager for serious violations of the repository policies.

4.1.4.4 Data Rights

All users (i.e., suppliers, repository staff, and reusers) are to respect the individual data rights of individuals or organizations. The staff shall be responsible for ensuring that:

- All submitted components contain clear, standard statements of appropriate data rights information, e.g., "Certificate of Origin" on page 40.
- All users are made aware of limited rights information that may reside on the repository, e.g., on-line user information that inform all users of the standard locations where terms and conditions (or restrictions and releases) are documented, e.g., "Component Terms and Conditions Form" on page 41.
- All distributed components that require special labels that describe ownership and restrictions are so identified in the repository and on distributions of the component to reusers, e.g., "Distribution Labels" on page 43.

- All users are made aware that they should notify the STARS Repository System manager if they recognize or believe incorrect data rights information is stored in the repository (or in items distributed from the repository).

4.2 SUPPLIERS

The following policies and procedures apply to anyone that submits components or other information to the repository, i.e., new or revised components and information relating to repository components.

4.2.1 POLICY

1. All suppliers and potential suppliers wishing to participate in the STARS Repository program shall be registered as defined in the General Policies stated above.

2. Any supplier wishing to remain active shall adhere to the established policies and procedures established for the STARS Repository.

3. Supplier, owner, or contributor shall submit information with complete documentation of data rights, i.e., document complete ownership and include appropriate joint ownership releases (as defined in the STARS Operational Procedures).

4. Do not submit any information that is known to have or require a DoD security classification other than "UNCLASSIFIED".

5. Do not submit any information that is or should be ITAR controlled unless the procedures defined in the STARS Operational Procedures are followed.

6. All information required for submitted components shall be supplied complete and in the form or forms specified in the STARS Operational Procedures. This includes content, media, and formats processable by the available STARS Repository hardware and software systems.

7. Decisions on Component Qualification or Disqualification are to be made by the STARS Repository Manager, but appeals for review can be made to the STARS Program Manager or responsible organization within the DoD. Likewise, Component Migration and Retention is as defined in the STARS Operational Procedures, and all conflict resolution decisions are made by the STARS Repository Manager. This includes decisions on the contents of any user supplied comments or reports.

4.2.2 PROCEDURES

Suppliers should include all information they consider reusable with the components submitted. This should include all information that is required (as described in CDRL items 1460, 1550, and 1570). The components submitted should also meet some stated objective or need. The components should require minimum re-work on the part of the reusers. If the submitted components use or require component versions that already exist in the repository, do not re-submit the duplicate versions of shared components. Also, duplicate component part versions (i.e., shared component parts) should not be transmitted or shipped. If the removal of duplicate versions of parts is not practical, then at least identify reused parts in new or revised component submissions.

Components, component revisions, and other communication related to submitted components shall be in a format and medium that is supported by the STARS Repository System.

4.2.2.1 New Components

Suppliers should attempt to evaluate and test submitted components using the same tools and following the same procedures as the repository librarian to increase the probability of the components being accepted. Otherwise, additional communication and/or rework will increase overhead cost for the component supply and repository operation process. Data that is required with every new component include component identification data (Figure 1 on page 39) and information describing the data rights of the component ("Certificate of Origin" on page 40).

4.2.2.2 Revised Components

Revisions and variations of existing components can be submitted to the repository by the original supplier or by reusers of the components, i.e., if permitted from a legal or data rights standpoint (CDRL 1460). A Change Report should always be submitted with a revised component to provide summary information for the existing subscribers or reusers as well as potential users. This report should list all Problem Reports that are addressed in the revision and any changes to existing limitations or capabilities that might be significant to reusers, i.e., information that might help users on decisions to move to a newer version of a component or that might help other users with an initial selection of a component version (or variation).

Always provide updated identification data (Figure 1 on page 39) when revisions to existing components are submitted. If applicable, also include revised data rights information. Revised components are tested and/or evaluated as a complete entity, as if the component ware a new submission. Previous versions of revised components will be retained on-line or archived by the librarian, according to current policies of the repository. Users that are currently subscribed to the component will

also be notified as appropriate; therefore, the supplier should not change the name of an existing component when a revision is made.

Major changes to the capability or function of an existing component can imply a new name if the two component versions are to coexist for an extended period of time. Duplicate component names can also be handled by unique component numbers associated with components stored in the repository. Suppliers should assist the librarian so decisions have the minimum impact on current or potential reusers. In general, if earlier versions of parts and/or components are useful from a reuse standpoint; therefore, retain existing previous versions of components or parts in such a manner that continued maintenance and selection can occur in the presence of new derived parts or components. When user selection of previous versions or variations stopped then the librarian will archive or delete the earlier versions or variations.

4.2.2.3 Component Promotion

The promotion of components to higher repository levels, e.g., certified, is a process accomplished by the librarian, but the supplier can improve or speed-up the process by making sure the required information and any optional information is provided, e.g., comprehensive test procedures, test case/driver logic, and test data are available.

4.3 REPOSITORY MANAGER

The Repository Manager will ensure that repository policies, guidelines, standards, and procedures are adequate and monitored when appropriate. The policies and procedures established for the STARS Repository should be maintained and accessible on-line by any user. This is desirable for either a Public access or limited access repository. Grouping of user information should be by user role, e.g., Repository Suppliers, Managers, and Re-users. The Repository Manager's responsibilities include the following:

- Operation of the STARS Repository System
- Adherence to Laws, Regulations, and Directives
- Fairness in the operation of the repository
- Standards and Usability of the repository
- Detection of Restricted and Proprietary Data
- Security and Auditing of the Repository
- Contract specified Cost and Fee considerations

4.3.1 POLICIES

1. Do not accept or store information that is marked (or you have reason to believe is) proprietary, Company Confidential, or DoD Confidential

(or higher). Return such information to the supplier and notify the STARS Project or DoD organization responsible for the repository.

2. Do not accept, store, or allow access to information that is marked (or you have reason to believe should be handled) as requiring special control for access and distribution, e.g., ITAR, until such time as an adequate protection is provided by the Repository System.

3. Ensure that STARS Repository Procedures and adequate protection exist for information (other than Government owned with unlimited distribution and Public Domain) before such information is available for user access. A defined set of independent audits of the procedures, facilities, and repository operations shall occur before a new restricted access class is supported. The procedures should establish routine and/or random audits for some restricted access classes, e.g., ITAR controlled items.

4. Priorities shall be established and approved by the STARS Program or DoD organization responsible for the repository before soliciting new components from suppliers. Likewise, filtering procedures and acceptance/rejection criteria should be baselined, made available on-line for current users, and distributed to potential suppliers (and included with any solicitation for components).

5. All laws, regulations, and directives must be obeyed. Report any known inconsistencies to the STARS Program or responsible organization. Document all procedures used to ensure compliance with laws, regulations, and directives.

4.3.2 COMMUNICATION

The Repository Manager shall periodically report the status of the STARS Repository System and a summary of the component reuse/subscription data as defined in the repository operations contract. This information will be distributed as specified in the contract, but no data will be included in the reports that identify specific users, to allow maximum availability of the reports to interested parties.

4.3.3 PROCEDURES

The contractor managing the Repository System will face some risk, e.g., real or a perceived bias (or unfair advantage) with respect to operating the STARS Repository System. The bias or risk can be overcome somewhat by the independent selection of hardware, software, and interfaces, i.e., industry standards selected to build or to grow the Repository System. An impact to the contractor could be the possible exclusion from specific procurements, e.g., selecting or developing specific reusable components.

A competitive advantage could be gained if the contractor managing the repository gained a significant experience with the contents and the capabilities of the repository to better compete for related software

development. This could become very significant if the contractor was to treat one registered user organization different from others. This possibility implies that at least a code of conduct is required on the operation of the repository. Other users may need to be guided by this code of conduct since there may be cases where the action of one user could possible affect another user.

In addition, procedures used in the operation of the repository and the control of repository capabilities should be periodically reviewed to ensure their current validity and fairness to the current and potential users of the repository. The following paragraphs define an initial set of procedures for the operation of the repository.

4.3.3.1 User Interface

The initial sign-on response and high-level menus should allow any user to locate general information about the repository. This information should define the scope, use, and ownership of the information contained in the repository and should also be a cookbook on how to use the various features of the repository as well as the reusable contents. It should also state that Problem Reports and Problem Report Responses generated by users of the repository can be used by other users of the repository without restriction. It should clearly point out that the reports are to be interpreted in a specific context, e.g., they are not necessarily the belief of the original author or current owner of the Component.

Likewise, the Repository System Problem Reports are not necessarily the opinions of the Repository Manager or operations personnel. The responses to System Problems should be approved by the Repository Manager, and the Component Problem Response should be approved by the Component Owner before the Problem Report is considered closed. All information contained within a Component or Component Part (Variation or Version) should be considered a part of that component and not changed unless a new Variation or Version is created. The purpose of this dual strategy (i.e., dynamic reports and static component contents) is to increase the confidence of potential users and not require individual users to track changes and change rationale. This should be accomplished through the Component or Component Part Change Reports, and therefore the users can get the information to select particular repository entries, i.e, initial selections or subsequent replacement of a previously selected items.

4.3.3.2 Laws, Regulations, and Directives

It is very important to establish an evolving STARS Operational Procedure to provide day to day guidance to all organizations and individuals since laws, regulations, and directives will continue to change. Likewise, the interpretation of these items are will evolve based on court decisions and the understanding that individuals have of the terminology and the evolving reuse technology. In particular, the Repository System must have procedures that are easily understood and carried out by the users, i.e.,

Repository Suppliers, Repository Managers, and the Re-users. In particular, the procedures should address and reference the following items:

- Freedom of Information Act
- Privacy Act
- Federal Records Act
- Export Control Laws
- Regulations and Directives

Explicit policies and procedures can avoid significant problems with the above items by preventing needless retention of information, by limiting access to the information that must be retained, and by securing only that information that can not be made available to all users. Components covered by Export Control Laws and International Traffic in Arms Regulations (ITAR) can be satisfied without a major effort by using the Data and Analysis Center for Software (DACS) as a model.

4.3.3.3 Standards and Usability

The selection of the set of standards to be supported in a repository as well as the repository capabilities can affect one contractor to a greater extent than it would another contractor. This includes such items as access to interconnected networks and the interface standards used for remote dial-up terminals. The publishing of catalogues and other indexes used to select components off-line could assist in this area. The selection of standards or changes that affect usability of the repository should be approved by the STARS Program or the responsible organization within the DoD.

4.3.3.4 Restricted and Proprietary Data

If restricted or proprietary data is stored in the repository, then the contractor managing or supporting the operation of the repository could be exposed to additional risks related to intellectual property or trade secrets. This could involve nondisclosure agreements with the owners of the material. It could also require the individuals supporting operation of the repository to be restricted from specific activities during the support period or for a period of time after such support.

4.3.3.5 Security and Auditing

The complexity and magnitude of the STARS Repository System, including the hardware, software, and operating procedures, are such that security and other types of audits should be done on a regular basis. Reports generated by the audits should be forwarded to the STARS Program or the responsible organization within the DoD.

4.3.3.6 Cost and Fee Procedures

The charging of user fees or the collecting or billing of royalties for Government or commercially owned items is beyond scope of this report. It should be noted that other repositories do charge users for specific requested items, e.g., DACS and NASA's COSMIC repository (CDRL 1450). Additional capabilities would be required in the STARS Repository System and the Operating Procedures to charge users, e.g. a fee for distribution of the Components or Component Parts selected by a user.

4.4 REPOSITORY SYSTEM ADMINISTRATOR

The following paragraphs describe the system administrator role and the polices and procedures that relate directly to that role. This may be one individual or multiple individuals with specific skills and responsibilities, e.g., database administrator (BDA). Specific individual assignments related to the STARS Repository System, e.g., installing new products, are assumed to be an administrator's task.

4.4.1 REPOSITORY SYSTEM PROCEDURES

The administrator of the repository system is responsible for the proper day-to-day operation of the system including both the hardware ("Hardware" on page 8) and the software ("Software" on page 9). The administrator shall maintain a set of detailed operating procedures and records that would allow reassignment of specific tasks and support auditing of the repository system operation. The current prototype repository system has provided an opportunity to study and document practical aspects of the repository operation (CDRL 1440).

The administrator shall also update the portion of the evolution plan that relates to the system hardware and software in the following areas:

- Security of physical and intellectual property
- Integrity of the system capability and data
- Capacity planning and capacity management
- Response time and availability of the system
- User command menus, information, and support

4.4.1.1 Security

The administrator shall ensure the security of physical and intellectual assets by planning and accomplishing the following items:

- Physically secure the computer equipment
- Meet or exceed electrical and fire codes
- Escort all visitors in the computer room

- Use access control on all computer files
- Track and periodically audit all assets
- Maintain current set of authorized users
- Keep correct address/distribution lists
- Require and monitor the use of passwords
- Remind users of their responsibilities
- Report known/possible security breaches
- Conduct/have independent security audits

Many of the above items require continuous execution; others require execution as the need arises or periodic accomplishment, e.g., audits of all assets and reminding the users of their responsibilities. Detail procedures shall be defined to describe the methods used and frequency.

4.4.1.2 Integrity

The administrator shall ensure the integrity of the repository system and repository contents by planning and accomplishing the following items:

- Backup repository system data off-site
- Test all new/updated products off-line
- Check imported software for viruses, etc.
- Specify data checking (equipment/modes)
- Provide and test backup/recovery process

The administrator shall work directly with the repository librarian to ensure that the integrity requirements/approach are complete and efficient for the repository capabilities, the repository data, and the repository users' data.

4.4.1.3 Capacity, availability, and response time

The administrator shall ensure adequate data processing, storage, and communication is available for the repository system and repository contents by planning and accomplishing the following items:

- Ensure adequate buffer for static and peak load
- Select products that monitor performance
- Periodically monitor/report system load
- Tune the processing/database capability
- Repair or replacement of failed equipment

The above items should be worked on with the repository librarian, but stay within the resources available to the repository manager. The resources expenditure should be balanced to provide maximum repository utility but be consistent with the evolution plan and repository operation contract.

4.4.1.4 User Support

The administrator has the primary responsibility to provide support to the repository system users by providing the following services:

- Provide on-line and off-line user assistance
- Installing on-line product help or information
- Ensuring that information is concise and clear
- Bulk distribution of information to new users
- Answer/refer repository system problem reports

4.4.2 REPORT PROCESSING

The administrator shall monitor the problem reports generated against each product and ensure that the vendors or other responsible individuals receive the reports and that appropriate closure and/or reassignment is accomplished. Invalid or outdated reports should be removed from the system. Repository system menus, general information, and specific information should be maintained to reflect the current status of the currently supported products or tools. Status should include significant items contained in problem report responses. A brief summary of the significant user reported items and major new or updated capabilities should be announced or referenced on the system sign-on screen.

The administrator should always send a message to the originator of a problem report to provide immediate feedback on a possible work-around and to thank the individual for the effort to report the problem. The originator should also receive a message when the problem report is or will be closed at a later date. In general, encourage users to generate problem reports and to provide candidate alternatives to other users.

4.5 REPOSITORY LIBRARIAN

The following paragraphs describe the repository librarian role and the polices and procedures that relate directly to that role. The librarian may be one individual or multiple individuals with specific skills and responsibilities, e.g., domain or topic specialist and reuse experts. Specific individual assignments related to the repository contents, e.g., evaluation of a submitted component, are presented as librarian tasks. The actual tasks may be performed by an individual performing more than a conventional librarian's role, e.g., component problem tracking and maintenance, and the expanded role could be called the "repositarian".

4.5.1 REPOSITORY PROCEDURES

The primary task for the librarian is to receive candidate components from suppliers or other sources of reusable components or information. Can-

didate components are to be processed quickly and in a efficient manner but caution should always be exercised since minor problems that go undetected can result in significant loss of time and resources (by multiple reusers that review or select a defective component). The librarian should acknowledge receipt of candidate components to the supplier as soon as they are received and provide an estimate of the time it will take to process the components and install or add them to the repository. Notify the supplier if this estimate changes by more than one week.

Return all supplied items, e.g., components, to the submitter if one or more repository policies are violated, e.g., inclusion of proprietary items without prior agreement between the repository manager and the supplier. Also notify the repository manager of all items rejected or returned to the supplier along with the rationale for the action.

4.5.1.1 Checking and Updating Database Information

The librarian shall ensure the supplier is either currently registered or the appropriate forms are attached or can be filled out and added to the repository database. The librarian shall:

- Add required information to the database for all first-time suppliers (Figure 4 on page 44) and for all unique organizations (Figure 6 on page 45).
- Add component information (Figure 1 on page 39) after the component is processed and accepted.
- Add contract information (Figure 7 on page 46) if the candidate component was developed or updated under a specific Government contract.
- Update existing database information when provided on new or updated forms, but duplicate information will not be stored, e.g., user, organization, or contract descriptions.
- Test new registrations entries and all updates to user or organization data by using the information for sending a response to the supplier and/or organization's designated coordinator.

4.5.1.2 Checking Data Rights Information

Check all owner-related information, e.g., a Certificate of Origin that describes "data rights" history of a software component. If the component submitted to the repository is a complete system, subsystem, or other major unit that has one or more reusable sub-units then the entire set must be assumed to have the same disclaimer and release of data rights. A set of the certificates for such a Component would be very desirable. Otherwise, individual selectable sub-units would have to have this data documented in the individual sub-unit prologues (CDRL 1460).

The only reason for any sub-unit granularity is based of the advantage of being able to break-up major delivery items into lower-level reusable information or software. The minimum information required is included in Figure 2 on page 40, and the form should identify and be signed by the both the Contracting Officer and the Contractor or their representatives.

Notify the supplier immediately of any missing or invalid information immediately, e.g., release of data rights by the author or owner.

4.5.1.3 Checking Basic Qualifications

Process all submitted components to ensure that the basic requirements and other criteria have been meet as described in the STARS Repository Guidebook (CDRL 1540). This includes all restrictions on media and format of the submitted material as well as required and recommended information content including:

- Component description and abstract
- Supplier and taxonomic information
- Owner and distribution limitations
- Component testing/using instructions

Notify the supplier immediately if required information is missing or if invalid data is present that would prevent further processing or potential selection by users. If a component fails to meet the minimum acceptance criteria (e.g., for entry into a depository level library), the librarian shall retain the submitted items for a period of 30 days (or longer if approved by the submitter and repository manager) to allow the supplier to submit additional items or to replace parts.

4.5.1.4 Checking Quality and Completeness

Each component submitted will be processed to ensure the minimum quality level for admission to the repository. Additional checks (within the available repository resources, i.e., tools, computer capacity, and labor hours) will be made to minimize the impact to reusers. A prototype (CDRL 1570) of an automated process is available for the initial operation of the repository. The librarian should recommend additional tools or changes to the prototype to increase productivity, e.g., reduce cost by using an automatic analysis tool. Additional details of the manual and automated filtering processes are described in the following paragraphs. Additional details on the processes should be documented and maintained in future updates of these repository procedures and will including the following types of checks:

- compilation of Ada language parts
- build/link and execute test cases
- gather standard metrics on parts
- run text processor on SGML parts
- print or process Postscript parts
- display and review all ASCII text
- identify portability limitations
- identify usability characteristics
- identify interface/design standards

4.5.1.5 Component Loading

A candidate component can be added to the depository (e.g., only supplier data is checked) or to the filter repository after the component has met the minimum acceptance criteria (CDRL 1540). Loading can be delayed if the supplier agrees to make corrections that would significantly enhance the quality or the portability and usability characteristics of the component. Summaries, i.e., metrics or other analysis data, should be formatted for quick examination by potential reusers and included as a component part. All parts should be moved to a repository library, i.e., make accessible to the repository users.

The repository level at which the component is stored (e.g., depository, organized, or filtered) depends on the level the component was able to achieve in the filtering process. Any highest level, e.g., certified, requires additional independent testing and evaluation. The necessary levels and detailed processes to achieve the different levels is still to be determined through prototype experience and after justification of the cost, i.e., additional tools and repository capabilities.

4.5.2 DETAIL FILTERING PROCEDURES

All software components should contain a prologue as defined in the STARS Repository Operating Procedures (CDRL 1460) or contain the same type of information in an acceptable form provided by the supplier. Other reusable information submitted (e.g., documents) should contain similar data rights information and should be imbedded in each component in an acceptable format and transfer medium, i.e., in an electronic form acceptable for automatic processing by the STARS Repository supply tools or filtering process.

The following is a list of the prologue contents appearing in software from the Ada Software Repository (SIMTEL20) and may be used as a model. The original Terms and Conditions are usually not included in the unit. The releases contained in the SIMTEL20 and other repositories typically require that the prologue be copied along with the duplicated software, updated versions, or derivative work products.

- Header statements that identify the basic attributes of the unit
- Copyright statement and basic overview information about the unit
- Distribution and copyright limitations and/or release statements
- Disclaimer statements intended to relieve the author of liability
- Terms and conditions imposed by contracts associated with the unit
- Restrictions imposed on this unit by laws/regulations or contracts

The term unit is used since one or more units may be stored in a single software program or distribution file. Programming languages, such as Ada, allow software specifications to be in a separate unit from the implementation, and they may have different owners and different clauses included relating to data rights. A similar situation can occur for other forms of information, e.g., the parts or chapters of a document.

4.5.2.1 Header Statements

The purpose of the header of the prologue is to quickly identify the unit by name, version, and key individuals associated with the component part. In practice, some of the fields may have to be maintained by the Repository System, e.g., contact names and addresses. Other fields, e.g., versions, may have to be mapped to versions numbers maintained in the Repository System if derivative units are created.

4.5.2.2 Release Statements

The purpose of the Release portion of the prologue is to document the formal release or transfer of data rights for the unit. This should cover reproduction, distribution, modification, or the generation of derived work products unless the release removes all existing data rights of the author, all joint developers, and all subsequent owners of the unit. For Government or Government contracted software development this information may be copied from the Terms and Conditions related to the implementation.

4.5.2.3 Disclaimer Statements

The purpose of the disclaimer statement is to warn potential users that the unit may or may not be free of errors or be suited to the user's application or environment. Such statements are usually worded in such manner that would avoid or limit the liability of the author. These statements may or may not be adequate in particular cases or in specific court jurisdictions.

4.5.2.4 Restriction Statements

This portion of the prologue may not apply to all software and may be omitted or indicated as "NONE" in the comment field. This section should include or reference information related to Defense Acquisition Regulations (DAR) and/or explicit contract Terms and Conditions that the software was developed. This should include all items that relate to data rights, ownership, or other limitations that has been placed on the unit. Suppliers (developers or the owners), Reusers, and the STARS Repository Managers should be aware that contracts can be modified during the development phase or sub-contracts issued for the actual implementation; therefore this section should reflect the final set of Terms and Conditions or other legal restrictions that apply to the unit delivered to the repository. If export control laws apply, then the restrictions must be included in these statements.

4.5.2.5 Terms and Conditions

Terms and Conditions may have to be signed before requests for specific items in the repository can be made, i.e., an approved request form must be processed before the requested items can be distributed to the user. If the repository is expanded to distribute components where further distribution or incorporation into commercial products is not allowed, then procedures must be defined to must be control and track explicit requests for the component, e.g., software code and/or documentation.

Specific items on the form in Figure 3 on page 41 can be omitted, e.g., if export control is not involved. The remaining two items that are in the DACS request forms involve the possibility of receiving classified, proprietary, or export controlled items and need not be included if such material is not to be stored in the STARS Repository System; otherwise, ensure all the items listed in the form are included.

The completed form (or expanded form) shall identify and be signed by both the requestor and the approving authority or their representatives. The identification of individuals signing the request shall include their complete title, name, and address as well as the complete name and address of their respective organizations. This form shall also include the STARS Repository System number assigned to the requesting individual as well as an approved Contractor Number, e.g., as assigned by the Defense Logistics Services Center (DLSC). The sample user registration (Figure 4 on page 44) and organization (Figure 6 on page 45) are similar to the DACS registration forms currently being used except for the header and item one (1) and the substitution of the work "software" for "package" to simplify the terminology (note: software is defined as reusable components including documentation in item 1.).

4.5.2.6 Other Acceptance Criteria

Other criteria are described in the Repository Guidebook (CDRL 1540) and the process is included in the repository Filter Prototype (CDRL 1570). If the minimum acceptance criteria are met then the repository loading process can be initiated. If the minimum criteria is not met then the supplier shall be contacted and notified of the discrepancies. No further action should be taken until the minimum acceptance criteria is met.

4.5.3 DETAIL LOADING PROCEDURES

The sample forms in the appendix contain information that may also appear in a prologue of a component submitted to the repository. It may not feasible, however, for some types of components to have a prologue, e.g., a large set of information fragments. It is also likely that information being transferred from some other repository en masse will not have prologues. The librarian should use the information provided in the prologue (or found during the filtering process) to classify the component. The prologue type information can be stored as a shared component part for

those components where it is not feasible to include a prologue with each individual prologue. The information will be used (in either case) to initialize the database tables that are required to support component search and access (CDRL 1600).

4.5.3.1 Facets and Facet Terms

The currently defined facets and terms supported by the repository should be matched against the characteristics or attributes of the component and the database tables set to allow selection of the component by users that are searching for one or more of these characteristics. The librarian should also maintain a list of the attributes that do not match the current facets, facet terms, and aliases of terms. This list should be examined periodically with the a history of the currently used facets and terms to determine when the repository capability should be updated.

4.5.3.2 Attributes

The repository supports a set of attributes that have not been defined in the faceted classification scheme, e.g., author. Some of these attributes could become facets if the repository prototype experience justifies such a change, e.g., the set of authors could be predefined and one or more picked for a search operation. Until that occurs, the database has to be updated to connect the attribute value to the component and the user has to be prompted to enter a specific attribute value (including possible wild-cards supported by the database system).

4.5.3.3 hierarchical classification

The librarian should attempt to classify each component with the existing taxonomy or classification index used by the prototype repository. This is useful for storing and searching for contract deliverables are already in a task break-down order. Users can then search and browse CDRL items in the groupings they were contracted and delivered without knowing the specific attributes. A list of the problems encountered in hierarchical classification of the components should be maintained for possible future modifications to the classifications. Periodically review the list of problems along with user comments to determine when a change should be made.

4.5.3.4 Keyword Search Support

The current prototype repository should be modified to support a keyword search scheme. The supply and the filter processes should be modified

to check for keywords in the component prologue. These words can also assist the librarian in the classification of the component.

4.5.4 DETAIL DISTRIBUTION PROCEDURES

When hard-copy or off-line bulk distribution is supported, these procedures have to be updated to include the management of duplication services and control over consumables, e.g., tapes, diskettes, and printer paper. At this time all distribution is assumed to be in electronic form and to be initiated and controlled by the repository user, e.g., individual file transfer using Kermit or any other method.

4.5.5 REPOSITORY ARCHIVE/PURGE PROCEDURES

A detail set of procedures should be developed and maintained to ensure the repository resources are not burdened by outdated or unused versions or variations of components. The initial procedure could be to delete all previous versions of components 60 days after user retrievals have stopped for the particular version or variation. Current subscribers should be notified that a new version or variation is available and that the usage of old versions will determine when an archive/purge is to occur. The advantage of retaining older version is to provide users with selection options that they can select after reviewing change and problem reports of the current on-line versions.

4.5.6 REPORT PROCESSING

The librarian should monitor the problem reports generated against the components and ensure that the supplier or other responsible individual receives the report and that appropriate closure and/or reassignment is accomplished. Invalid or outdated reports should be removed from the repository. Change reports should also be reviewed to ensure that the information is concise, correct, and contains references to other information, e.g., problem reports written against earlier versions of the component.

The librarian should regenerate the on-line catalog anytime a major set of components is added to the repository. The current subscribers to a component should be sent a message when a new version of that component is added. These subscribers should also be sent a message when a major problem is detected or is closed for that component, e.g., a work-around to a major problem is defined.

4.6 COMPONENT REUSER/SUBSCRIBER

The repository component reuser or any user subscribing to components within the repository shall adhere to all repository polices relating to the use of the repository and repository components. This includes complete and correct registration information, updating of passwords, and reporting of security violations. The most current general user information and messages from the operations staff should be examined immediately before accessing the repository contents or before using repository services, e.g., the Ada compiler. Detailed user requirements and procedures are documented in text files available after sign-on.

APPENDIX A. REPOSITORY SYSTEM DESCRIPTION

The following description of the hardware and software contained in the repository system is not intended to complete but is included to provide an overview the repository operation. This overview is intended to help define the knowledge and/or skills required of the operations staff.

A.1 REPOSITORY SYSTEM HARDWARE

The following hardware descriptions represent typical elements that can be used to implement a specific instance of a repository system.

A.1.1 PROCESSORS

The computer for the STARS Repository, e.g., a central repository for the STARS Program, shall be a commercially available processor selected to meet the documented standards and performance requirements. Peak processing requirements are determined by the system capabilities made available to the user and the magnitude of the individual processing requests, e.g., database searches, compilation of source, and execution of test cases to evaluate selected components. The computer system shall have the capability to support many concurrent users and to support assigning priority to component search, access, and distribution.

A.1.2 STORAGE

The on-line storage capability shall be sufficient to support the user's data requirements and the response time constraints for the repository system. The user data requirements include the user registration data and user's own local storage required by the repository services, e.g., execution of component analysis tools and the Ada compiler. Off-line storage shall be provided for backup of the repository system and for archiving seldom used or previous versions of repository components, repository system capabilities, and computer system products.

Archives shall be used to provide additional backup for system failures. Standard magnetic tapes, diskettes, and other media shall be available for backups, for archives, and for bulk distribution. The hardware includes both the storage device and associated computer system interface devices. Both electronic and hard-copy information, e.g., duplicates of user registration forms, shall be maintained off-site from the STARS Repository to protect against the total destruction of data.

A.1.3 COMMUNICATION

User communication hardware includes computer console terminals, remote user terminals, modems, rotary dial-up connection units, local and remote networks, and interface devices required for the computer and network connections. The numbers of devices and data rates supported shall be documented in the repository system evolution plan along with the network protocols and device interface standards. A summary of the current capabilities and standards shall be available on-line and documented in the Repository Guidebook.

A.1.4 NETWORKS AND TERMINALS

One or more terminals are required to operate and maintain the STARS Repository System. The set of terminals types used by the operational staff shall be a good cross-section of the wide set of terminals that are expected to be used by the suppliers and reusers. This also includes the "Terminal/Network Support" on page 36 designed to emulate standard terminal types or network protocols. As the STARS Repository System evolves, the range of terminals may include powerful workstations designed to support the various phases of the software-first life cycle, e.g., preliminary design or prototype. One or more networks could be installed for development, porting, and testing of components, e.g., Ethernet.

A.1.5 PERIPHERALS

In addition to the storage devices, additional peripherals shall be available to produce or duplicate hard-copy (e.g., printed reports) and electronic or optical media required for bulk distribution. This includes the production of hard-copy catalogs, reports, and mailing labels. It also includes tapes, diskettes, and other media for bulk distribution, e.g., to sites not connected by high-speed data links.

A.2 REPOSITORY SYSTEM SOFTWARE

The following software descriptions represent typical products that can be used to implement a specific instance of a repository system.

A.2.1 GENERAL SUPPORT

The primary software required by the repository system is the Operating System (OS). The OS manages the resources of the computer system and provides services to the operations staff and to the repository system user. The OS and associated commercial support products shall be selected

to be compatible with the "Hardware" on page 8 and the STARS Repository System. Other general software requirements can be satisfied by the commercial Operating System or by separate licensed or purchased products including:

- Configuration Management System
- Performance/Response Measurement
- Resource Utilization Measurement
- User Accounting/Billing System
- Communication by mail and forum

A.2.2 TERMINAL/NETWORK SUPPORT

Commercial or Government developed software is required to support the minimum set of terminals and networks directly involved with the STARS Repository System. Additional combinations of equivalent products could provide additional repository services, i.e., capabilities for problem analysis in direct support of registered users, porting and testing of repository components, and improving the usability, capability, and scope of the STARS Repository System. Examples of products and/or component testing environments are:

- Ethernet and Token-Ring Networks (and bridges)
- Dial-up/Modems, e.g., 1200, 2400, and 9600
- Terminal OS or emulators, e.g.,
  - DEC VT100 and VT220 (trademarks of Digital Equipment Corporation)
  - IBM PC RT and PS/2 (trademarks of the IBM Corporation)
- Terminal emulators, e.g.,
  - IBM File Transfer and Terminal Emulator Program (FTTERM)
  - Persoft Smarterm 220 (trademark of Persoft Corporation)
  - ProComm (trademark of Datastorm Technologies Corporation)
- File Transfer methods, e.g.,
  - FTP (File Transfer Protocol, see note below)
  - KERMIT
  - XMODEM/YMODEM
- Distributed process/data methods, e.g.,
  - RPC (Remote Procedure Call, see note below)
  - Distributed and/or Network Server databases

Note: Compatible Terminal Control Program/Internet Protocol (TCP/IP) and network/bridge software is required for FTP or RPC support.

A.2.3 TEXT AND GRAPHICS SUPPORT

The current support in the STARS Repository System is limited to ASCII character text documents and to Postscript. The documents can include imbedded figures and examples that are simple graphics containing only valid characters represented as allowed by the Standard Generalized Markup Language (SGML). Some of these capabilities are available (e.g., postscript generation), or various prototypes are in existence. The

long-term requirements for text and graphic support products or tools include:

- Text and graphic editors
- Text and graphic formatters
- Simple character/line diagrams
- Libraries of graphic symbols
- Complex 2-D and 3-D Diagrams
- Display and printing support

A.2.4 PROGRAMMING SUPPORT

The minimum requirement is for an integrated Ada Programming Support Environment (APSE) that can be used to evolve and maintain the STARS Repository System. This includes a compiler, linker, debugger, and a complete Ada Run Time Environment (ARTE). The APSE, including the ARTE, shall also be used to support the development and maintenance of the repository contents. Additional hardware and/or software may be required to support the porting and testing of the reusable components on other host or target platforms, e.g., a different vendor's hardware and operation system. The responsibility for porting and testing on other platforms can be assigned to the component supplier or be covered by separate contracts, different contractors and contractor sites. The STARS Repository System can be used to store and distribute components that are developed and verified to execute on different platforms.

Assembler language support is required in the APSE for each platform to develop and maintain interfaces to the hardware and software products, e.g., Virtual Operating System Interface (VOSI), Ada/SQL Bindings, and Graphical Device Interfaces (GDI). Depending on the particular binding to commercial standards or interfaces to specific commercial products, other language and VOSI support tools may also be required, e.g., data conversion from one standard to another commercial standard. Initially a commercial relational data base management system (RDBMS) is being used, but as the STARS Program evolves the database could be migrated to a comprehensive object oriented data base management system (OODBMS).

In addition to the minimum APSE requirement, the following capabilities, products, or tools shall be integrated with the STARS Repository System.

- Language Sensitive Editor for Ada
- Ada source-code/static analysis tools
- Ada object-code/run-time analysis tools
- Assembler/Assembly Language support tools
- Ada/SQL Bindings to the commercial RDBMS
- Graphic System Bindings/Interface, e.g., GKS

A.2.5 DATABASE SUPPORT

The database support requirements includes both a sequential file storage hierarchy and relational table storage (RDBMS). Specific requirements include:

- Table, sequential file, and file directory backup and recovery
- Transaction level or multiple access data table/file protection
- Access security including creation, updating, and read-only
- Performance measurements and accounting or usage monitoring
- Report generation, mail or print formatting, and distribution

The commercial OS that is currently used by the STARS Repository System provides most of the required services. The commercial RDBMS used by the STARS Repository System provides several of the other required services.

A.2.6 PERIPHERAL SUPPORT

The specific support software depends on the specific hardware and software products used in the STARS Repository System and network access to repository users but in general includes the following items:

- Report or text output spooling and line printer control
- User file collection and distribution, e.g., magnetic tape
- Repository report generation and distribution, e.g., changes
- Component report generation and distribution, e.g., catalog

The commercial Operating System (OS) that is currently used by the STARS Repository System and in the prototype capabilities (CDRL 1600) provide most of the required services.

APPENDIX B. REPOSITORY SYSTEM FORMS

B.1 COMPONENT REGISTRATION FORM

The first form, Figure 1, contains data that will vary depending upon the type of component being submitted. This form is to be expanded or altered for new repository scope or requirements.

STARS REPOSITORY SYSTEM
Component Registration Form

Name: _____

Version: _____ Old Component ID: _____

Access Type: _____ Contract ID: _____

Author ID: _____ Owner ID: _____

Attributes: (Required unless supplied in the Component Prologue)

Type: ____SOFTWARE_____ Class: _____

Medium: _____ Size: _____

Structure: _____ Format: _____

Concurrency: _____ Bounded: _____

Media Mgmt.: _____ Iteration: _____

Contact: _____

User Identification Name: _____

Organization Identification Number: _____

---------- Completed by Repository System ----------

Repository Entrance Date: _____

New Component Identification Number: _____

Notes: Attach Certificate of Origin Forms to all new components and revised/duplicate forms to new versions of components.

Attach Change Reports for all new versions of registered components/component parts (by Name and Version Number).

Figure 1. Example of Component Registration Form

B.2 CERTIFICATE OF ORIGIN

The data supplied in the certificate is similar to data a Contracting Officer might request from the contractor based on statements contained in the Request for Proposals, e.g., "the offerer agrees to furnish clear and convincing evidence that the data which will be so identified comes within the definition of limited rights data." The actual providers of all or portions of the software may be the subcontractors of the contractor.

STARS REPOSITORY SYSTEM
Certificate of Origin Form

Identification	
Contract Name:	(full name of the development/buy contact)
Contract Number:	(Government contract number if applicable)
Unit Name:	(full name of the software unit described)
Unit Version:	(full identification, release number, etc.)
Copyright Information	(required or specified NO COPYRIGHT exists)
Copyright Owner:	(full name of individual or company owner)
Date of First Issue:	(Copyright date, not contract/delivery date)
Date of Last Revision:	(required or stated as NO EXISTING REVISION)
Owner(s) of Unit	(repeat the following items for each owner)
Name of Owner:	(full name of individual or company owner)
Owner's Address:	(complete current address of above owner) (use required number of lines)
Item Description:	(Brief description of developed/bought items) (use required number of lines)
Imported Elements:	(Brief description, source of Non-U.S. items) (use required number of lines)
Restrictions	
Security Restrictions:	(Brief description, reason for restriction) (use required number of lines)
Privacy Restrictions:	(Brief description, reason for restriction) (use required number of lines)
Export Restrictions:	(Brief description, reason for restriction) (use required number of lines)
Market Restrictions:	(Brief description, reason for restriction) (use required number of lines)

Figure 2. Sample Certificate of Origin Form

B.3 COMPONENT TERMS AND CONDITIONS FORM

The next form, Figure 3, documents the terms and conditions reuser must agree to before specific restricted libraries may be accessed or the corresponding components are retrieved, e.g., ITAR, Government programs only, and DoD programs only.

STARS REPOSITORY SYSTEM
Component Terms and Conditions Form

(1) Release of the following Repository component(s) is requested:
(repeat the following line as required)

Name: _____ Number: _____

(2a) Requested component/s will be used on the following contract(s):
(repeat the following line as required)

Contract Name _____ Number: _____

(2b) Requested components will be used for the following purpose(s):
(repeat the following line as required)

_____

(3) I/we will be responsible for assuring that the component(s) or component parts will not be marketed, sold, or published for a profit either as a set or as separate entities so as to be in competition with commercial firms. Component(s) or parts can be used in commercial or Government applications/developments.

(4) Use of this software or a modified version will be made known to the Government when it is used on a Government contract(s). I/we guarantee that the components will not be offered in sale to the Government. If the components are modified, expanded, or improved in any manner then only those resources, e.g., labor hours, may be sold once, and only once, to the Government. If component are modified, expanded, or improved using Government funds, then the Government owns the modified/improved version.

(5) The Government is neither liable nor responsible for maintenance, updating, or correcting any errors in the components provided. Neither is the Government and any Government contracted agent for development or distribution of these component(s) liable for any direct or indirect cost resulting from the use of the component(s). There are no warranties of merchantability nor fitness for a particular purpose, either implied or expressed.

(6) I/we understand that no material subject to national defense security classification or proprietary rights was intended to be released to us. I/we will report promptly the discovery of any material of such restriction to the STARS Repository System manager and to the approving authority. I/we will follow all instructions concerning the use or return of such material, and will not further study, use, or copy such material subject to security or proprietary rights markings on components or parts.

(7) I/we understand that the software received is subject to export control laws, and I/we will abide by those regulations as they apply to the component(s) or component part(s) provided to us.

Signature Date: _____	Signature Date: _____
_____	_____
Signature of Requestor	Signature of Approving Authority
_____	_____
Name of the Requestor	Name of the Approving Authority
_____	_____
Title of Requestor	Title of the Approving Authority
_____	_____
Organization of Requestor	Organization/Location of Authority
_____	_____
Mailing Address of Requestor	Mailing Address of Authority
_____	_____
City, State, and Zip Code	City, State, and Zip Code

---------- Completed by Repository System ----------

Requestor ID: _____	Authority ID: _____
Receipt Date: _____	Reviewed by: _____

Figure 3. Example of Component Distribution Form

B.4 DISTRIBUTION LABELS

The following is a sample label that should be attached to all physical media that is distributed to authorized users when the material contains export-controlled technical data. This same information will also be included in a component part that is automatically displayed to the user when authorized to browse or retrieve a export controlled component.

STARS REPOSITORY SYSTEM
Distribution of the following items is Limited

(component name, repeat as required)

Distribution is authorized to U.S. Government agencies and private individuals or enterprises eligible to obtain this export-controlled technical data in accordance with regulations implementing Title 10, USC 140c, October 1987.

WARNING: This document/tape contains technical data whose export is restricted by the Arms Export Control Act (Title 22 USC 2751 et seq.) or the Export Administration Act of 1979, as amended (Title 50, USC, APP. et seq.)

Violations of these laws subject to criminal penalties.

Disseminate in accordance with provisions of AFR 80-34.

Figure 4. Example of a Restricted Distribution Label

B.5 USER REGISTRATION FORM

This form is used to enter in data for any person, regardless of their role in the Repository (Supplier, Manager, Re-user, Owner, etc.). This information will be entered only once for each person and will be updated or deleted when the information is no longer valid.

STARS REPOSITORY SYSTEM
User Registration Form

Name: _____ ____ _____
(First) (MI) (Last)

Title: _____ Position: _____

Nationality: _____ U.S.Status _____

Organization Identification Number: _____

Requested User Identification Name: _____

Optional Network Address: _____

---------- Completed by Repository System ----------

Requested User Identification Name: _____

Figure 5. Example of User Registration Form

B.6 ORGANIZATION REGISTRATION FORM

This form is used to enter in data for any organization represented in the Repository. This information will be entered only once but will be updated or deleted if the information changes.

STARS REPOSITORY SYSTEM
Organization Registration Form

Organization: _____

_____

_____

_____

Address: _____

_____

_____

_____ _____ _____
(City) (State) (ZIP-Code)

_____ _____
(Country) (Phone Number)

---------- Completed by Repository System ----------

Organization Identification Number: _____

Qualified Contractor Access Number: _____

Note: The above registration numbers may be based on numbers assigned to the attached copy of DD FORM 2245 approved by:

United States/Canada Joint Certification Office
Defense Logistics Service Center, Federal Center
Battle Creek, MI 49017-3084

Attach one or more completed User Registration forms and indicate the primary (and optional alternates) coordinators.

Figure 6. Example of Organization Registration Form

B.7 CONTRACT REGISTRATION FORM

This form is used to enter in data for all contract represented in the Repository. This information will be entered only once but will be upated or deleted if the information or contact changes.

STARS REPOSITORY SYSTEM
Contract Registration Form

Contract Number: _____

Contract Name: _____

_____

Contracting Agency: _____

_____

Contact Name: _____

Address: _____

_____

_____

Optional Network Address: _____

---------- Completed by Repository System ----------

Organization Identification Number: _____

Contract Contact Identification Name: _____

Figure 7. Example of Contract Registration Form